

## **REMARKS**

### **State of the Claims**

Claims 12-23 are pending. Claims 12 and 17 have been amended to remove the 35 U.S.C. § 112 issues from the claims. No new matter has been added.

### **35 U.S.C. § 112 Rejections**

Claims 12-16 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor, at the time the application was filed, had possession of the claimed invention. Specifically, the Examiner asserts that the limitation in Claim 12 “excluding sodium hydroxide treated activated carbon particles” does not appear to be supported by the disclosure originally filed, and therefore constitutes new matter.

Applicants have amended Claim 12 by removing the contested subject matter, therefore obviating the Examiner’s rejection.

Applicants therefore respectfully request reconsideration and allowance of Claims 12-16 over the Examiner’s 35 U.S.C. § 112, first paragraph, rejection.

Claims 17-23 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicants regard as their invention. Specifically, the Examiner states that the term “selected from the group comprising of” in Claim 17 is deemed to be improper Markush language and is therefore indefinite.

Claim 17 has been amended by Applicants by removing all of the contested terms. No new matter has been added.

Applicants therefore request reconsideration and allowance of Claims 17-23 over the Examiner’s 35 U.S.C. § 112, second paragraph, rejection.

### **35 U.S.C. § 102(b) Rejection**

Claims 17 and 20-23 stand rejected under 35 U.S.C. § 102(b) as being clearly anticipated by Wallis, et al. (U.S. Patent No. 3,770,625). The Examiner asserts that Wallis ‘625 discloses a filter comprising a housing, a filter core comprising activated carbon granules and/or pellets in the housing. The Examiner also asserts that Wallis ‘625 further teaches that their filter has a virus removal index of 100%.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.<sup>1</sup> The identical invention must be shown in as complete detail as is contained in the claim.<sup>2</sup> The elements must be arranged as required by the claim.<sup>3</sup>

Applicants respectfully disagree with the Examiner's contentions and assert that the Examiner has failed to assess one of the important features of Applicants' Claim 12: i.e., that Applicants' VRI of 99.99% is based upon a flow rate of 100 mL/min. of flow through their filter at 1 hour and at an influent concentration of  $5 \times 10^8$  MS-2 bacteriophages per liter. Applicants point out that the standard for viral removal in a water filter is Standard 55, established by the Environmental Protection Agency (EPA) in 1991.<sup>4</sup> This standard typically uses the MS-2 bacteriophage because of its size and shape; i.e., 25 nanometers (nm) and spherical.<sup>5</sup> Thus, a filter's ability to remove a virus with these characteristics, generally, or a MS-2 bacteriophage, in particular, demonstrates its ability to remove nano-sized pathogens in the 25 nanometer size range.<sup>6</sup>

Wallis '625 does not teach the removal of MS-2 bacteriophage or any other virus' of that size and shape. Rather, Wallis '625 merely teaches the removal of virus generically without specifying a size or shape. Applicants assert that because their standard for viral removal is based upon a type of virus having a particularly small size, merely teaching virus removal generically, without more, does not anticipate Applicants' claims.

Also, Wallis '625 fails to teach Applicants' much greater volume of virus removal. Wallis '625 teaches the removal of virus in water containing about  $5 \times 10^6$  infectious particles per 100 mL.<sup>7</sup> This is nowhere near Applicants' level of viral removal from 100 mL of water; namely, viral removal of 99.99% at  $5 \times 10^8$  MS-2 bacteriophage per liter. But because Applicants' specifically claim the removal of MS-2 bacteriophage, which Wallis '625 fails to teach, Applicants assert that even if Wallis '625 taught viral removal at Applicants' levels (which it does not), it would still not anticipate Applicants claims because it fails to teach the removal a virus having the size and shape characteristics of the MS-2 bacteriophage, namely, 25 nanometers and spherical.

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<sup>1</sup> Verdegaal Bros. V. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

<sup>2</sup> Richardson v. Suzuki Motor Co., 868 F. 2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

<sup>3</sup> In re Bond, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

<sup>4</sup> Applicants' Specification: page 1, lines 26-31.

<sup>5</sup> Id. at page 2, lines 1-4.

<sup>6</sup> Id. at page 2, lines 4-5.

Given that the above-noted elements are missing from Wallis '625, Applicants respectfully request reconsideration and allowance of Claims 17 and 20-23 over the Examiner's 35 U.S.C. § 102(b) rejection.

35 U.S.C. § 103 Rejection

Claims 18 and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Wallis '625. The Examiner asserts that Wallis '625 discloses the claimed invention with the exception of the recited bulk density of the filter core. The Examiner further asserts that it would have been obvious to one of skill in the art at the time the invention was made to employ a filter core having the recited bulk density in the Wallis '625 device in order to ensure adequate contact between the activated carbon of the Wallis '625 filter and the water undergoing treatment.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference must teach or suggest all of the claim limitations.<sup>8</sup>

Applicants respectfully disagree with the Examiner. First, as noted above, Wallis '625 is missing certain key elements recited by Applicants which are neither taught or suggested by Wallis '625. Wallis '625 does not teach the removal of the MS-2 bacteriophage (i.e., a particular type of virus). Also, Wallis '625 does not teach or suggest the removal of the MS-2 bacteriophage at the levels claimed by Applicants; namely, 99.99% removal of  $5 \times 10^8$  MS-2 bacteriophage per liter.

Instead, Wallis '625 merely claims the removal of virus and virus particles generically. Given the millions of types of virus known, Applicants assert that one of skill in the art, reading from Wallis '625 would not be motivated to build Applicants' filter for removing the MS-2 bacteriophage at  $5 \times 10^8$  per liter.

Applicants also respectfully assert that Wallis '625 does not teach or suggest Applicants' invention. Wallis' invention requires the use of both activated carbon particles and an inorganic hydrolyzing composition of matter containing sodium.<sup>9</sup> Applicants' specification teaches that it has now been surprisingly discovered that a filter comprising activated carbon particles alone can

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<sup>7</sup> U.S. Patent No. 3,770,625 (Wallis, et al.): col. 4, lines 41-42.

<sup>8</sup> In re Vaeck, 947 F. 2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

<sup>9</sup> U.S. Patent No. 3,770,625 (Wallis, et al.): at col. 1, lines 59-66.

reliably remove nano-sized pathogens from water.<sup>10</sup> In contrast, Wallis '625 teaches the inclusion of a coating that must cover their carbon particles.<sup>11</sup> Such a combination (i.e., carbon coated with sodium hydroxide) fails to teach or suggest Applicants' invention since Applicants' carbon particles are neither treated or coated with any secondary substance.

Applicants therefore assert that one of skill in the art looking solely at Wallis '625 would not have been motivated to remove the inorganic hydrolyzing composition (i.e., sodium hydroxide) from the carbon particles to achieve Applicants' uncoated carbon particles that remove  $5 \times 10^8$  MS-2 bacteriophage per liter alone without a secondary coating or material applied to the carbon particles. In stark contravention to this, Applicants' specification teaches that it has now been surprisingly discovered that a filter comprising activated carbon particles alone can reliably remove nano-sized pathogens from water.<sup>12</sup> Applicants also assert that upon removal of the sodium hydroxide, the invention of Wallis '625 would no longer operate as claimed and that such removal would violate the principles of operation of the invention.

Applicants point out that the Examiner has not previously addressed Applicants' important element of MS-2 bacteriophage virus-type removal. In none of the office actions received to date, namely, the office actions of 9/26/01, 6/04/02, 10/22/02 or the current above-noted office action has this important element been addressed. Also, the Examiner, to date, has produced no reference that teaches or suggests 1) the removal of virus' of the size and shape of the MS-2 bacteriophage virus nor 2) the removal of said virus types of 99.99% at  $5 \times 10^8$  per liter.

Therefore, Applicants respectfully request reconsideration and allowance of Claims 18 and 19 over the Examiner's 35 U.S.C. § 103(a) rejection in view of Wallis '625.

Claims 12-16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Koslow, et al. (U.S. Patent No. 5,922,803). The Examiner asserts that "since the particles of activated carbon in the reference filter are spaced from one another to produce a bulk density within the middle of the recited range...this reference will inherently have the recited Virus Removal Index."

Applicants respectfully disagree with the Examiner's assertions. Applicants contend that Koslow '803 does not teach Applicants' invention. Instead, Koslow '803 merely teaches the

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<sup>10</sup> Applicants' Specification: page 3, lines 10-12.

<sup>11</sup> U.S. Patent No. 3,770,625 (Wallis, et al.) at col. 2, lines 14-16: "Media for adsorbing virus such as activated carbon are treated with an inorganic sodium containing hydrolyzing composition such as sodium hydroxide." [Emphasis added.]

<sup>12</sup> Applicants' Specification: page 3, lines 10-12.

removal of sub-micron sized particles of size ranging from 0.5 micrometers ( $5.0 \times 10^{-5}$  m) to 0.8 micrometers ( $8.0 \times 10^{-5}$  m).<sup>13</sup> A micrometer is a unit of length equal to one millionth of a meter; i.e.,  $1 \mu\text{m} = 1 \times 10^{-6}$  m.<sup>14</sup> A nanometer is a unit of length equal to one-billionth of a meter, i.e.,  $1 \text{ nm} = 1 \times 10^{-9}$  m.<sup>15</sup> Applicants instead teach the removal of virus (e.g., MS-2 bacteriophage) having a size of 25 nanometers (i.e.,  $2.5 \times 10^{-8}$  m), i.e., one major order of magnitude greater than Koslow '803.

Koslow '803 does not teach or suggest the removal of any virus at Applicants' sizes. Also, Koslow '803 does not teach or suggest the removal of the MS-2 bacteriophage. Applicants therefore contend that one of skill in the art reading from Koslow '803 would not be motivated to construct a filter capable of removing the MS-2 bacteriophage in particular and virus' of the size of the MS-2 bacteriophage in general. In fact, Koslow's range for virus sizes, i.e., 0.5 micrometers to 0.8 micrometers, provides no teaching or suggestion to match Applicants' ability to remove virus' as small as 25 nanometers and spherical.

Given all of the points noted above, Applicants respectfully request reconsideration and allowance of Claims 12-16 over the Examiner's 35 U.S.C. § 103(a) rejection in view of Koslow '803.

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<sup>13</sup> Koslow, et al. (U.S. Patent No. 5,922,803): col. 1, lines 41-45.

<sup>14</sup> Merriam Webster's Collegiate Dictionary (10<sup>th</sup> Edition): page 735.

<sup>15</sup> Id. at page 772.

**SUMMARY**

The rejection in the Office Action has been discussed and, Applicants believe, the proper amendments have been set forth to address the rejection.

In light of both the amendments and the discussions contained herein, Applicants respectfully request reconsideration of the rejection and its withdrawal.

Issuance of a Notice of Allowance at an early date is earnestly solicited.

Respectfully submitted,

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